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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/507,574	02/18/2000	Alex E. S. Green	GRE-100C2	9675

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EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 12/12/2002

5

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-5

Office Action Summary	Application No.	Applicant(s)	
	09/507,574	GREEN, ALEX E. S.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 31 and 32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-30 and 33-36 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) 1-36 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: ____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-30 and 33-36, drawn to a method and apparatus for pyrolysis of feedstock, classified in class 48, subclass 62R, 209.
 - II. Claims 31-32, drawn to a method for recovery of a substance in plant matter, classified in class 48, subclass 209.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). The facts relied on for this conclusion are in essence the reasons for insisting upon restriction.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter and search required for Group I not required for Group II, restriction for examination purposes as indicated is proper.

2. During a telephone conversation with James Parker on December 11, 2002, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-30 and 33-36. Affirmation of this election must be made by applicant in replying to this Office action.

3. Claims 31-32 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Priority

4. On page 1, lines 8, "08/912,485 filed August 18, 1997." should be changed to --
08/912,485 filed August 18, 1997, now U.S. Patent 6,048,374. --

Drawings

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: In FIG. 5, "61".
6. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
7. The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings.

Specification

8. The disclosure is objected to because of the following informalities:
- On page 11, line 2: "reactor tube 15" should be changed to -- reactor tube 2 --, for proper reference to the drawings.
 - On page 11, line 16: -- (see FIG. 4) -- should be inserted after "spring loading 23", for proper reference to the drawings.
 - On page 11, line 20: -- or incoming -- should be inserted before "air 51", for consistency in terminology, as set forth in line 10.

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- On page 11, line 27: -- (see FIG. 4, 5) -- should be inserted after “burner 55”, for proper reference to the drawings.
- On page 12, line 7: -- or chamber -- should be inserted before “11”, for consistency in terminology, as set forth in line 4.
- On page 16, line 8: -- (see FIG. 4, 5) -- should be inserted after “burner 55”, for proper reference to the drawings.
- On page 16, line 26: -- or adjustable or spring loaded cone-like -- should be inserted after “the male cone” for consistency in terminology, as set forth on page 11, lines 11-12.
- On page 17, line 11: -- (see FIG. 1) -- should be inserted after “external hopper 15”, for proper reference to the drawings.
- On page 17, line 16: -- (see FIG. 1) -- should be inserted after “the outer hopper 8”, for proper reference to the drawings.

Appropriate correction is required.

9. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

10. Claim 1 is objected to because of the following informalities: “filler” (line 7) should be changed to -- filter --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 2, 11, 15, 19, 21, 26-28 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 2, it is unclear as to what is intended by, “and other organic matter”.

In claims 11 and 19, “can exit” is considered vague and indefinite, since whether or not an element is capable of performing a function does not constitute a limitation.

In claims 15 and 26, it is unclear as to what is intended by, “and other toxics”.

In claim 21, the language of the claim is directed to a method limitation, which renders the claim vague and indefinite as it is unclear as to what structural elements the applicant is attempting to recite, since “said gas” is not considered an element of the apparatus.

In claim 27, “volatile metals” lacks proper positive antecedent basis.

In claim 28, “volatile metallic oxides” and “metallic deposition” lack proper positive antecedent basis, since it is unclear as to how the metallic contaminants may be formed from the process comprising “feedstock containing at least one contaminant”, set forth in claim 25.

In claim 30, “the biomass” (lines 1, 2, 3) lacks proper positive antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 25, 27-28, 30 and 33-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Rotter (US 4,123,332).

With respect to claims 25 and 28, Rotter discloses a method of pyrolysis of feedstock containing at least one contaminant using indirectly heated gasification (column 2, line 46 to column 3, line 22; column 8, lines 3-column 9, line 64), comprising the following steps:

Moving feedstock containing at least one contaminant through a reactor tube 11; and

Heating the feedstock within said reactor tube (via 12) to a sufficient temperature such that pyrolysis occurs, wherein low oxygen conditions of pyrolysis exist.

The lower containment of the at least one contaminant in the gaseous output and higher capture and concentration of the at least one contaminant in the feedstock residue are inherent to the given method, given the substantially same (i.e. low oxygen) process conditions. Likewise, the lower formation of volatile metallic oxides and promotion of metallic deposition in the feedstock residue for feedstocks containing such contaminants.

With respect to claim 27, Rotter further discloses the step of scrubbing gas output from the pyrolysis (gas-liquid recovery system 50) to remove contaminants from the gas output. Depending on the particular feedstock used, the contaminant could comprise volatile metals.

With respect to claim 30, Rotter discloses a process where it is inherent that gases of gasification travel through the incoming feedstock, at least in part, such that the incoming

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feedstock introduced into the reactor tube 11 would inherently act as a filter, i.e. by providing a surface area for entraining generated dust particles in the exiting gases (FIG. 1).

With respect to claim 33, Rotter discloses a process for pyrolysis of feedstock (column 6, lines 22-57; column 8, line 54 to column 9, line 13; Figure 1), comprising the following steps: introducing feedstock into, and moving said feedstock through, a reactor tube 11; and heating (via 14) the feedstock within said reactor tube 11 to a sufficient temperature such that pyrolysis occurs.

With respect to claim 34, Rotter further disclose the process, comprising the step of introducing a gas (column 7, lines 41-column 8, line 2) into the reactor tube 11.

With respect to claim 35, Rotter further the gas may comprise steam (column 7, lines 41-column 8, line 2).

With respect to claim 36, Rotter further disclose the reactor tube 11 comprises an exit orifice 16, feedstock exiting the reactor tube 11 via the exit orifice 16 enters a pressure vessel 26 such that the pressure from the pressure vessel controls the flow of gases of pyrolysis exiting the pressure vessel (column 5, lines 57-column 6, line 21).

Instant claims 25, 27-28, 30 and 33-36 read on the method of Rotter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 26 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rotter (US 4,123,332) in view of Diebold et al. (US 5,504,259).

With respect to claim 26, Rotter discloses the process of pyrolysis may be used for any solid carbonizable feedstock, i.e. municipal wastes and wood, but is silent as to the specific contaminants present in the feedstock. Diebold et al. teach that it is well known in the art that other solid carbonizable feedstock such as refuse derived fuel (RDF) may be used in pyrolysis, and that in such feedstocks, heavy metal contaminants may become concentrated (column 11, lines 47-50). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to include RDF as a potential solid, carbonizable feedstock, and that RDF contains contaminants including heavy metals. One of ordinary skill in the art would have been motivated to combine the teachings Diebold et al. with Rotter, since both reference address the well known process of pyrolysis of organic materials.

With respect to claim 29, Rotter discloses the process of pyrolysis may be used for any solid carbonizable feedstock and cites the pyrolysis of plant matter such as wood, but is silent as to specifically plant matter used in phytoremediation. Diebold et al. further illustrate the conventionality of using various forms of solid carbonizable materials, such as biomass, as feedstock for pyrolysis. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to include plant matter of phytoremediation, which is

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encompassed within the scope of biomass, as a potential feedstock of pyrolysis. One of ordinary skill in the art would have been motivated to combine the teachings Diebold et al. with Rotter, since both reference address the well known process of pyrolysis of organic materials.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. Claims 1-6 and 8-36 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-50 of U.S. Patent No. 6,048,374. Although the conflicting claims are not identical, they are not patentably distinct from each other.

With respect to claim 1, applicant claims a process for pyrolysis of feedstock, obvious over U.S. '374 (note claims 1-26), comprising:

- Introducing feedstock into, and moving said feed stock through, a reactor tube;
- Heating the feedstock within said reactor tube to a sufficient temperature such that pyrolysis occurs;

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- Wherein the feedstock is introduced into the reactor tube from an inner hopper, wherein gases of pyrolysis travel through the feedstock in the inner hopper such that said feedstock in the inner hopper acts as a filter.

Specifically, the heat for heating the feedstock may be generated by a heat source comprising the combustion chamber.

With respect to claim 2, applicant claims a feedstock comprising substantially the substances of U.S. '374 (note claims 1-26).

With respect to claim 3, the heat generated by the heat source is in direct thermal contact with the reactor tube such that heat generated within the combustion chamber is transferred to the feedstock in the reactor tube (note U.S. '374, claims 1-26). Although the claim terminology is not identical, the heat source is substantially “conducted to the feedstock within the reactor tube through a reactor tube wall.”

With respect to claim 4, applicant claims substantially the process of moving feedstock through the reactor tube by a rotating auger as in U.S. '374 (note claims 1-26).

With respect to claim 5, applicant claims substantially the temperature ranges of U.S. '374 (note claims 1-26).

With respect to claim 6, applicant claims substantially the temperature ranges of U.S. '374 (note claims 1-26).

With respect to claim 8, applicant claims substantially the process of providing an exit orifice and controlling the flow of gases of pyrolysis from exiting the orifice, as in U.S. '374 (note claims 1-26).

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With respect to claims 9-10, applicant claims injection of a gas into the reactor tube, wherein the gas may be selected from the group consisting of CO₂, steam, natural gas, oxygen, and air, obvious over the method of U.S. '374 (note claims 1-26).

With respect to claim 11, applicant claims the process wherein the auger comprises at least one opening, wherein gases can exit, obvious over U.S. '374 (note claims 1-26).

With respect to claim 12, applicant claims the process comprising the step of controlling the flow of gases into and out of the reactor tube, obvious over U.S. '374 (note claims 1-26).

With respect to claim 13, applicant claims substantially the process of U.S. '374, comprising the step of capturing the feedstock residue exiting the reactor tube, wherein the process is useful for pyrolysis of feedstock comprising a contaminant (note claims 1-26).

With respect to claim 14, applicant claims a process, obvious over U.S. '374 (note claims 1-26), wherein said contaminant is selected from the group consisting of heavy metals, copper chromium arsenate, and other toxics. Phytomining is defined by the applicant as "the concentration of the metals picked up by plants" (specification page 13, lines 4-5).

With respect to claim 15, applicant claims substantially the contaminants of U.S. '374 (note claims 1-26).

With respect to claim 16, applicant claims a device for pyrolysis of feedstock, obvious over U.S. '374 (note claims 27-36 and 46-50), comprising:

- A reactor tube within which pyrolysis of feedstock occurs;
- A means for moving the feedstock through the reactor tube; and

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- An inner hopper, wherein the feedstock is introduced into the reactor tube from the inner hopper, wherein gases of pyrolysis travel through the feedstock in the inner hopper such that said feedstock in the inner hopper acts as a filter.

Furthermore, a means (specification page 4, lines 14-18; page 6, line 27 - page 7, line 3) for heating the feedstock within said reactor tube may comprise a combustion chamber positioned such that the combustion chamber is in direct thermal contact with the reactor tube such that heat generated within the combustion chamber is transferred to the feedstock in the reactor tube to provide heat of pyrolysis.

With respect to claim 17, applicant further claims said means for moving feedstock comprises a rotating auger, obvious over U.S. '374 (note claims 27-36, 46-50).

With respect to claim 18, applicant further claims the device comprising an exit orifice, obvious over U.S. '374 (note claims 27-36 and 46-50).

With respect to claim 19, applicant further claims the device wherein the auger comprises a hollow shaft having at least one opening, obvious over U.S. '374 (note claims 27-36, 46-50).

With respect to claim 20, applicant further claims the device comprising a means for injecting a gas into the exit orifice of the reactor tube, obvious over U.S. '374 (note claims 27-36 and 46-50).

With respect to claim 21, applicant further claims the gas may be selected from the group consisting of carbon dioxide, steam, natural gas, oxygen and air, obvious over the "portion of the pyrolysis gases or external gases" of U.S. '374 (note claims 27-36 and 46-50). In any event, no further structural limitations are recited since the language of the claim is drawn towards a method limitation, as the gas is not an element of the apparatus.

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With respect to claim 22-23, applicant further claims the device comprising a means for capturing the feedstock residue exiting the reactor tube, obvious over U.S. '374 (note claims 27-36 and 46-50). Usefulness in a specific process is intended use and therefore not considered an element of the apparatus.

With respect to claim 24, applicant further claims a means whereby a portion of the pyrolysis gases or external gases are injected into a lower end of the hollow shaft to hasten the transport of condensable gases to an external condenser liquid separator, obvious over U.S. '374 (note claims 27-36 and 46-50).

With respect to claim 25, applicant claims a method of pyrolysis of feedstock containing at least one contaminant using indirectly heated gasification, obvious over U.S. '374 (note claims 37-45), comprising:

- Moving the feedstock containing at least one contaminant through a reactor tube; and
- Heating the feedstock within said reactor tube to a sufficient temperature such that pyrolysis occurs,
- Wherein low oxygen conditions of pyrolysis leads to lower containment of the at least one contaminant in the gaseous output and higher capture and concentration of the at least one contaminant in the feedstock residue.

With respect to claim 26, applicant claims a method comprising substantially the at least one contaminant of U.S. '374 (note claims 37-45).

With respect to claim 27, applicant claims a method comprising the step of scrubbing (i.e. filtering) the gas output from the pyrolysis to remove volatile metals from the gas output, obvious over U.S. '374 (note claims 37-45).

With respect to claim 28, applicant claims a method comprising low oxygen conditions of pyrolysis, obvious over U.S. '374 (note claims 37-45).

With respect to claim 29, applicant claims a method for phytoremediation, obvious over U.S. '374 (note claims 37-45).

With respect to claim 30, applicant claims a method comprising biomass introduction and gas travel substantially the method of U.S. '374 (note claims 37-45).

With respect to claim 33, applicant claims a process for pyrolysis of feedstock, obvious over U.S. '374 (note claims 1-26), comprising:

- Introducing feedstock into, and moving said feedstock through, a reactor tube; and
- Heating the feedstock within said reactor tube to a sufficient temperature such that pyrolysis occurs.

With respect to claims 34-35, applicant claims injection of a gas into the reactor tube, wherein the gas may be selected from the group consisting of CO₂, steam, natural gas, oxygen, and air, obvious over the method of U.S. '374 (note claims 1-26).

With respect to claim 36, applicant claims a process wherein the reactor tube comprises an exit orifice, obvious over U.S. '374 (note claims 1-26).

15. Claim 7 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-50 of U.S. Patent No. 6,048,374, as applied to claim 1 above, and further in view of Mansour et al. (U.S. 5,059,404).

Although U.S. '374 is silent as to claiming the process further comprising an additional reactor tube, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least one additional reactor tube to the apparatus of U.S. '374,

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since the duplication of part involves merely conventional knowledge in the art, as evidenced by Mansour et al. Mansour et al. teach a process for the gasification of feedstock such as biomass, comprising the step introducing the feedstock through at least one additional reactor tube 5 (FIG. 1), preferable over a single tube, and heating the feedstock within said at least one additional reactor tube such that gasification occurs. In any event, duplication of part was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung *JAL*
December 11, 2002

Hien Tran
HIEN TRAN
PRIMARY EXAMINER